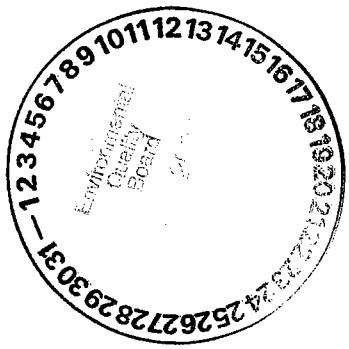
Minnesota Pollution Control Agency

April 1, 2004



Mr. Bill Storm
Environmental Quality Board
658 Cedar Street
St. Paul, MN 55155

Re: Comments on the Environmental Impact Statement for Faribault Energy Park

Dear Mr. Storm:

Thank you for the opportunity to comment on the Environmental Impact Statement (EIS) for Faribault Energy Park (FEP) to be built in Rice County. This comment letter addresses matters of concern to Minnesota Pollution Control Agency (MPCA) staff reviewing the EIS. MPCA staff is submitting the following comments for your considerations and response before a final determination on an adequacy decision is made for this project.

Air Emissions Risk Analysis (AERA)
Section H.1. of the scoping document requires the EIS to include information from FEP's AERA. FEP submitted AERA documents to the Environmental Quality Board (EQB) and the MPCA on February 20, 2004. MPCA staff did not have time to complete their review of the AERA prior to the EIS's public release date of March 1, 2004. MPCA staff worked with FEP during the public comment period in order to correct and refine the AERA information. Because the AERA information was updated after the EIS was put on public notice, the AERA information contained in the draft EIS was obsolete (Tables 13-17, and 19). The enclosures to this letter include all the updated AERA tables and information that should be made available for public review. With the inclusion of this additional information, the MPCA would find the EIS adequate for an air emissions risk analysis.

The purpose of the AERA is to aid the MPCA in examining possible health risks from a list of toxic chemicals and to help the public understand those risks. In simple terms, the AERA is a screening tool that allows the MPCA to examine health risks from chemicals that are emitted from a facility. The AERA uses conservative assumptions to determine if a more refined risk assessment is necessary. The term "risk" generally refers to estimated cancer risks and the potential for noncancer health effects. Noncancer health effects are described using a hazard quotient (for a single chemical) or a hazard index (the sum of hazard quotients for all noncancer chemical exposures). In the AERA process, "quantitative analysis" specifically refers to the estimation of cancer risks and hazard indices using the Risk Assessment Screening Spreadsheet (included in the enclosures). The AERA process additionally includes a "qualitative analysis," which identifies issues for which public health impacts cannot easily be easily quantified.

The MPCA managers met on March 29, 2004, to hear and discuss staff's findings on the AERA. After consideration of the information, the managers concluded that the AERA was complete, and that the impacts associated with the air emissions that are reasonably expected to occur from this project have been adequately characterized.

Other Comments on the Draft EIS
The following comments are meant to clarify wrong or missing information in certain sections of the EIS.

4.5 Wastewater
This section states that the project will need to obtain a National Pollution Discharge Elimination System/State Disposal System (NPDES/SDS) permit from the MPCA. However, this permit is missing from the permit requirements in Table 24. Table 24 should read, "NPDES/SDS permit for non-contact cooling water."

The project does not identify any disposal of industrial wastewater. MPCA staff questions whether the only wastewater will be from noncontact cooling water and sanitary sources. Will they have water generated from a maintenance washing area or other nondomestic sources?

6.11 Hazardous Wastes
The federal designation of Conditionally Exempt Small Quantity Generator is not used in Minnesota, as Minnesota rules are more stringent. The correct hazardous waste generator designation for this facility is Very Small Quantity Generator (VSQG). Through this designation, the facility would be required to obtain a U.S. Environmental Protection Agency (EPA) ID number. This number is acquired through the MPCA. In addition, Table 24 lists FEP as needing to register as a Small Quantity Generator. This should read VSQG.

6.2.1 Water Resources – Surface Water
According to the 1996 National Water Quality Inventory, stormwater runoff is a leading source of water pollution. The EPA estimates that 20 to 150 tons of soil per acre is lost to stormwater runoff from construction sites. Many studies indicate that controlling erosion can significantly reduce the amount of sedimentation and other pollutants transported by runoff from construction sites.

To that end, the MPCA's Stormwater Program for construction activity is designed to reduce the amount of sediment and pollution entering surface and ground water both during and after construction projects. Stormwater discharges associated with construction activities are regulated through the use of NPDES permits. Through this permit, the owner is required to develop a stormwater pollution prevention plan that incorporates specific best management practices applicable to their site.

The sections that address stormwater do not seem to recognize Minnesota's new General Stormwater Permit for Construction Activity. The new permit, which went through extensive public comment, became effective on August 1, 2003 (http://www.pca.state.mn.us/water/stormwater/stormwater-c.html). The new program is called "Phase II Construction Stormwater Permit" (Phase II). (The Phase I Construction Stormwater permit program expired on September 3, 2003.) Phase II requires a Stormwater Pollution Prevention Plan (SWPPP), which is more comprehensive than the Temporary Erosion and Sediment Control Plans mentioned in the EIS. The SWPPP requires narratives, standard plates, identifies who will perform inspections and maintenance, and other requirements. In addition, Phase II allows for more options for permanent stormwater treatment. The proposed stormwater retention pond is likely adequate; however, FEP may want to review the Phase II rules for more options as they prepare their final design.

And last, section 4.9 briefly describes best management practices (BMPs) to be employed during site development. While this is a good list, FEP should make sure they are implementing BMPs in accordance with Phase II.

Comments on Sections Related to Air Quality

Executive Summary
In the fourth paragraph from the end, the EIS states "...FEP will comply with the lowest achievable emission rate established under the Federal Clean Air Act." This is incorrect. FEP will meet Best Available Control Technology (BACT), not lowest achievable emission rate (LAER).

4.7 Air Emission Control Equipment
In the fifth paragraph under this section, it states, "Once the Minnesota Pollution Control Agency (MPCA) reviews the Prevention of Significant Deterioration (PSD) Air Quality Permit application, the MPCA may require that the facility utilize an oxidation catalyst as an addition to the proposed air emission control equipment to further reduce emissions of CO and VOCs." MPCA staff has now reviewed the application, and will not require an oxidation catalyst at this time.

6.4 Air Quality
Section D.3. of the scoping document states that the EIS will address carbon dioxide emissions. A discussion of this pollutant appears to be missing.

Table 10
The asterisk at the bottom of the table should read:
*Worst case NOx and SO2 emissions occur at 100% load during normal operation for 2500 hours per year, ~~i~~unlike PM~~2~~/PM10, CO, and VOC worst case emissions, which occur during startup and shutdown.

Also in table 10, the value for NOx across from the "Combustion Turbine Subtotal" should read "48.83."

Table 11
For acrolein, the potential emissions in pounds per year should read "105" instead of "10.5."

If you have questions regarding these comments, please call me at (651) 297-1766.

Sincerely,

Susan Heffron

Susan Heffron
EQB Technical Representative

SH:mbo

Enclosures

cc: David Thornton, MPCA

MINNESOTA POLLUTION CONTROL
AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

AERA-IF-0F
RISK MANAGEMENT AERA SUMMARY

February 2004

1a) AQ Facility ID No.: 13100071
1b) AQ File No.: 4131
2) Facility Name: Faribault Energy Park
3) Date of Submittal:
4) Date Summary given to Managers: DRAFT on 3/25/04, 3/26/04, Presented at meeting 3/29/04
5) Date of Decision: 3/31/04

6) General Assessment Considerations

- PTE emission estimates of fuel oil combustion. For simple cycle this assumes a maximum of 500 hours operation and for combined cycle it assumes 8760 hours per year.
- Refined modeling "at and beyond" the fence line for "high first high" concentration
- Resident and subsistence farmer scenarios are each plausible. Resident at farm house located near area of maximum modeled 1 hour impacts and annual impacts from simple cycle operation.
- Per AERA guidance, risks not quantified from: natural gas combustion, diesel emissions, majority of the VOC emissions, fish consumption pathway (fishable water bodies are located near the proposed facility), criteria pollutants (other than lead and acute NOx)

7) Quantitative Risk Estimates and Associated Qualitative Factors:

Simple Cycle

- No risks exceeded the criteria, no modeled concentrations exceeded the ceiling values for developmental effects.
- The acute HQ for NOx was 0.3, other chemical risks below 0.1 HQ and 10-6 cancer risk criteria
- Risks estimated based on 7% of VOCs and 100% of identified HAPS

Air Toxics Screen											
Total Inhalation Screening Hazard Indices and Cancer Risks				Total Indirect Pathway Screening Hazard Indices and Cancer Risks				Total Multipathway Screening Hazard Indices and Cancer Risks			
Acute	Subchronic Noncancer	Chronic Noncancer	Cancer	Farmer Noncancer	Farmer Cancer	Resident Noncancer	Resident Cancer	Farmer Noncancer	Farmer Cancer	Resident Noncancer	Resident Cancer
3.1E-01	3.6E-06	1.5E-04	5.7E-09	1.1E-07	4.8E-08		4.7E-10	1.5E-04	5.4E-08	1.5E-04	6.2E-0
1.0E+00	1.0E+00	1.0E+00	1.0E-05	1.0E+00	1.0E-05	1.0E+00	1.0E-05	1.0E+00	1.0E-05	1.0E+00	1.0E-0
OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK

MINNESOTA POLLUTION CONTROL
AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

Combined Cycle

- Additional lifetime cancer risk estimate for subsistence farmer is 5 x 10-5
- No modeled concentrations exceeded the ceiling values for developmental effects.
- Majority of additional cancer risk is based on estimated POM emissions assessed using uncertain, likely conservative, benzo(a)pyrene surrogate
- Majority of additional cancer risk is derived from estimated ingestion exposures
- Risks based on 2% of VOCs and 100% of identified HAPs

Air Toxics Screen											
Total Inhalation Screening Hazard Indices and Cancer Risks				Total Indirect Pathway Screening Hazard Indices and Cancer Risks				Total Multipathway Screening Hazard Indices and Cancer Risks			
Acute	Subchronic Noncancer	Chronic Noncancer	Cancer	Farmer Noncancer	Farmer Cancer	Resident Noncancer	Resident Cancer	Farmer Noncancer	Farmer Cancer	Resident Noncancer	Resident Cancer
1.1E-01	1.8E-03	2.4E-02	1.4E-06	1.6E-04	4.5E-05		1.3E-07	2.4E-02	4.7E-05	2.4E-02	1.6E-06
1.0E+00	1.0E+00	1.0E+00	1.0E-05	1.0E+00	1.0E-05	1.0E+00	1.0E-05	1.0E+00	1.0E-05	1.0E+00	1.0E-05
OK	OK	OK	OK	OK	REFINE		OK	OK	REFINE	OK	OK

8) Dispersion Modeling Comments and Recommendations:
Approve dispersion modeling portion of AERA. Results are likely more accurate and less conservative that dispersion factors from RASS look-up tables or DISPERSE program..

9) Emission Calculations: Comments and Recommendations:
RASS emissions data was reviewed and corrections were made by the Permittee in response to the permit writer's review of the data. Although available information was utilized, emission factors are unavailable for some of the numerous chemicals of combustion.
PERMIT STAFF INFORMED FEP OF THE EXCESSIVE FARMER CANCER RISK, AND THAT THE RISK MANAGERS WILL BE CONSIDERING THIS ISSUE WHEN THEY MAKE A DETERMINATION ABOUT THE OVERALL RISK FROM THE FEP PROJECT. THIS INFORMATION WAS CONVEYED THROUGH VERBAL TELEPHONE AND EMAIL COMMUNICATIONS. THE INFORMATION WAS PROVIDED IN RESPONSE TO FEP'S INQUIRY ABOUT THE STATUS AND TIMELINE OF THE PERMIT PUBLIC NOTICING.

Additional Qualitative Considerations Include:

MINNESOTA POLLUTION CONTROL
AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

Nearby Receptors: No sensitive receptors were identified within a kilometer of the proposed facility. There appears to be a farm house northeast of the proposed facility. The site vicinity is sparsely populated, with more densely populated areas of Fairbault located a mile to the south. The population surrounding the proposed facility may increase if Fairbault expands to the north. The vicinity is currently agricultural. See the census maps of the proposed facility vicinity.

Nearby Facilities (within 1 mile): Williams Pipeline Co., Primera Foods Inc., and the airport are located roughly within a mile of the site. Traffic from the nearby I-35 and other local roads is an additional source of air pollution near the site.

Accidental Releases: NA

Diesel Generators: During testing and emergency use, diesel engine exhaust, which is composed of NOx, SO2, various air toxics, PAHs, fine particles and other chemicals. Hazards associated with exposures to diesel exhaust include respiratory irritation. Longer term exposures may result in cancer and chronic bronchitis. The emergency generator and fire pump engines would be tested once per week.

Direct $PM_{2.5}$ Emissions: PM2.5 emissions were estimated using emission factors developed by EPA for its National Emission Inventory (ftp://ftp.epa.gov/EmisInventory/prelim2002nei/point/documentation/egu2002nei_final.pdf). The estimates take annual limits on fuel oil use into account but assume emissions are uncontrolled. Faribault Energy Park will employ good combustion practices but will not add any control equipment for PM10 or PM2.5.

The PM2.5 emission estimates for the two operating scenarios are 1.76 tpy and 6.82 lb/hr for the simple cycle turbine, 34.2 tpy and 7.80 lb/hr for the combined cycle turbine, and 0.315 tpy (0.0720 lb/hr) for the boiler. The boiler will only run during combined cycle operation. Annual PM2.5 emissions from the combined cycle turbine are relatively higher than those from the simple cycle turbine due to higher limits on fuel oil burning. As shown, hourly emissions for the two scenarios are similar.

Air Monitoring Results: Ambient air pollutant monitoring data for air toxics and criteria pollutants, collected from the statewide monitoring program, are summarized in the attached graphics. A summary of the recently monitored air toxic concentrations in the Twin Cities Metropolitan Area is available at http://www.pca.state.mn.us/hot/legislature/reports/2003/lr-airtoxmonitoring-1sy03.pdf. In general, the statewide air toxics monitoring data has found that benzene and formaldehyde are routinely measured at levels near or above their respective inhalation health benchmarks (based on 10-5 additional cancer risk levels). A significant portion of the statewide inventory of these pollutants is from mobile sources. The concentrations of these pollutants have been found to be somewhat higher in urban areas than in the rural areas. This generalization has been found in MN and nationally. Cities size of Fairbault have generally been found to have air toxic concentrations on the order of those found in the Twin Cities suburbs, such as Apple Valley. With respect to PM2.5, average annual concentrations in the southern

half of Minnesota range between 9 ug/m3 and 12 ug/m3 (compared to an annual standard of 15 ug/m3). No Minnesota monitoring data is available for PAHs or POM.

MN Emission Inventory Info: For reference, the 1999 emission inventory (estimated actual emissions) for POM, PAH and 7-PAH was sorted and the top facility emissions are listed on the attachments. Note that the AERA emission estimates are PTE, so these will clearly be higher than those estimated for the emission inventory. However, for reference, the fuel oil estimates for combined cycle PAH are 0.039 tpy and for POM 0.0027 tpy. For POM, this would implies that the combined cycle would emit less than the 84th facility in the statewide ranking for this specific pollutant, and for PAH the combined cycle estimated PAH PTE is higher than all but one facility in the state (reported actuals).

Respiratory Sensitizers: Beryllium and nickel are emitted from fuel oil combustion. As for all respiratory sensitizers, although their concentrations are well below their respective health benchmarks, due to the variable nature of the allergic response in sensitized individuals, it is not possible to predict at what the concentration a previously sensitized may experience adverse effects.

Developmental Toxicants: These include arsenic, benzene and mercury from the simple cycle; and arsenic, benzene, mercury and ethyl benzene from the combined cycle. None were above their respective ceiling values. In addition, although carbon tetrachloride and chloroform may possibly be emitted, quantitative emission estimates were unavailable.

Community Concerns: None have been identified

State and Federal Requirements:
*What state and federal control requirements apply?*BACT is required for combined cycle operation. Source is an affected source under part 63 subp. YYYY for combustion turbines, but the source is not a major HAP source so subp. YYYY does not apply

Demonstrated technical feasibility: Catalytic Oxidizer is technically feasible for CO, which also would control organic HAPs.

Demonstrated economic feasibility: Catalytic oxidizer is not economically feasible according to the BACT analysis. Good combustion practice is BACT, for CO, which will also minimize organic HAP. GCP includes limits for operating in startup/.shutdown mode when CO and organic HAP emissions are highest.

If hazard indices exceed 1 and cancer risks exceed 10^{-5}, does the project have a reasonable level of emissions control? Yes, the combined cycle combustion turbine will have a reasonable level of control (good combustion practices)

Conservativeness of the Quantitative Analysis (i.e., underestimates potential health risks?):
Especially with respect to the combined cycle operations, which were assumed to burn fuel oil 8760

hours/year, this is a conservative assumption. Using benzo(a)pyrene as a surrogate for POM and PAH is also considered conservative (in addition to being quite uncertain). Limitations in the emission factor databases result in significant additional uncertainties. The refined dispersion analysis was not very conservative, especially compared to the screening level modeling available in the RASS lookup table. Most of the estimated risks are derived from the multimedia ingestion exposure route. Due to the multimedia modeling complexity, and the exclusion of the fish consumption scenario, this is relatively more uncertain than the inhalation route risks. The conservativeness of the multimedia modeling for a subsistence farmer is unknown. Because only a small fraction of the VOCs were assessed, this is not conservative. Following general EPA guidance, the AERA process estimates total hazard indices and cancer risks for air toxics (summary table section 7), however this estimate does not account for risks from criteria pollutants. In this respect, the risk estimates are not conservative.

Considerations for analysis:

1. Issues that can be clarified through a refined analysis: Use of future actual emissions rather than PTE emissions (accompanied by an appropriate permit limit). The following would help refine the analysis but would be resource-intensive:
    - Review of the multimedia modeling approach and assumptions, including the use of site-specific factors (which would include assessing the fish consumption from the lakes),
    - Improved emission estimates to include more of the mass emitted,
    - Speciation of the POM and PAH mass emissions &/or development of a toxicity value for the fuel oil combustion mixture

2. Issues that a refined analysis will not resolve:

Staff team recommendations:

Additional refinements listed above would result in lower risk estimates. However, other factors, not currently included in the scope of the analysis, would result in higher risk estimates, so it's not clear that it would be meaningful to further refine this analysis.

MINNESOTA POLLUTION CONTROL
AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

AERA-IF-0F
RISK MANAGEMENT AERA SUMMARY

February 2004

Decision options:

1. Refined assessment needed
2. Facility risk analysis is complete. Env. Review and/or permitting proceeds.
3. Request mitigative measures
4. Recommend EIS

Decision: Facility risk analysis is complete. Environmental Review and/or permitting proceeds.

Management Rationale:
The MPCA Risk Managers met on March 29, 2004 to discuss this AERA. Staff presented the information contained in this document and discussed their conclusions and concerns.

After consideration of all of this information the Risk Managers conclude that the facility air risk analysis is complete and that the impacts associated with air emissions that are reasonably expected to occur from this project do not have the potential for significant environmental or health effects.

In reaching this decision and conclusion, the Risk Managers note the following:
1) Emissions were estimated based on full-time operation (8760 hours per year) with fuel oil. This facility is intended to operate as an intermediate load plant with natural gas as its primary fuel. Thus the emissions assumed in the analysis represent a significant over estimate of the emissions that would be reasonably expected to occur. 2) Mercury emissions estimated from AP-42 may be unreliable. Other data suggests emissions would be insignificant (<1 lb/yr.) 3) The maximum expected risk is for a farmer ingesting food grown at the sight of maximum impact. The point of maximum exposure for the farmer is just outside the fence line of the facility. This represents an exposure scenario that is not likely to occur. In addition, the farmer risk is based on the assumption that all POM and PAH is benzo(a)pyrene, This is a conservative assumption. Any attempt to speciate further is only likely to reduce the risk. Therefore the estimated farmer risk is considered to be an overestimate while taking into account the uncertainties summarized above.

Section Manager Signatures and dates

3/31/04
3/31/04
3/31/04

Summary of Quantitative Results of the AERA

RASS version number = 20040302

Facility Name:	Faribault Energy Park
User Title:	FEP Combined Cycle Calculations February 2004 Version
Type of emissions	PTE

Criteria Pollutant Screen

Chemical	Fraction of 1 hr std	Fraction of 3 hr std	Fraction of 24 hr std	Fraction of qtrly std	Fraction of annual std
SO2	0.027	0.032	0.022		0.003
PM10			0.345		0.011
PM2.5					
NOx					0.005
CO	0.010				
Pb				0.000	

Air Toxics Screen

Total Inhalation Screening Hazard Indices and Cancer Risks				Total Indirect Pathway Screening Hazard Indices and Cancer Risks				Total Multipathway Screening Hazard Indices and Cancer Risks				
Acute	Subchronic Noncancer	Chronic Noncancer	Cancer	Farmer Noncancer	Farmer Cancer	Resident Noncancer	Resident Cancer	Farmer Noncancer	Farmer Cancer	Resident Noncancer	Resident Cancer	
1.1E-07	1.8E-04	2.1E-02	1.4E-06	1.0E-04	4.5E-05		1.8E-07	2.4E-02	4.7E-05	2.4E-02	2.5E-06	
1.0E+00	1.0E+00	1.0E+00	1.0E-05	1.0E+00	1.0E-05	1.0E+00	1.0E-05	1.0E+00	1.0E-05	1.0E+00	1.0E-05	<<<Acceptable Level
OK	OK	OK	OK	OK	REFINE		OK	OK	REFINE	OK	OK	<<<OK or Not?

Fraction of VOCs assessed	0.020
Fraction of HAPs assessed	1.000

Total Criteria Pollutant Emissions (tpy)	1537.146
Total HAP Emissions (tpy)	13.884
Total VOC Emissions (tpy)	350.052

Ceiling Values Exceeded?	
Benzene	no
Carbon disulfide	no
Cellosolve Acetate	no
Chloroform	no
2-ethoxyethanol	no
Ethylbenzene	no
Ethyl chloride	no
2-methoxyethanol	no
Trichloroethylene	no
Arsenic	no
Carbon tetrachloride	no
Mercury	no
Propylene oxide	no

AERA Screening Level Estimated Risks for Inhalation Exposures, Ingestion Exposures and for the Combination of Inhalation and Ingestion

Facility Name: Faribault Energy Park

User Title: FEP Combined Cycle Calculations February 2004 Version

cas # or MPCA #	Chemical Name	Screening Inhalation Hazard Quotients and Cancer Risks for Individual Substances				Chronic Screening Non-inhalation Pathway Hazard Quotients and Cancer Risks for Individual Substances				Chronic Screening Total Hazard Quotients and Cancer Risks (Inhalation + Non-inhalation) for Individual Substances			
		Acute ISHQ	Subchronic Noncancer ISHQ	Chronic Noncancer ISHQ	ISIR(ca)	Farmer Noncancer	Farmer Cancer	Resident Noncancer	Resident Cancer	Farmer Noncancer	Farmer Cancer	Resident Noncancer	Resident Cancer
7664-41-7	Ammonia	3.2E-03	1.0E-03	5.1E-04						5.1E-04		5.1E-04	
7440-38-2	Arsenic	3.3E-02		2.3E-03	2.9E-07					2.3E-03	2.9E-07	2.3E-03	2.9E-07
56-55-3	Benz[a]anthracene				2.4E-11		2.4E-09		6.3E-11		2.4E-09		8.6E-11
71-43-2	Benzene	2.8E-05		6.8E-06	1.6E-09					6.8E-06	1.6E-09	6.8E-06	1.6E-09
207-08-9	Benzo(k)fluoranthene				8.6E-12		5.2E-09		9.6E-12		5.2E-09		1.8E-11
50-32-8	Benzo[a]pyrene												
205-99-2	Benzo[b]fluoranthene				8.6E-12		2.6E-09		1.3E-11		2.6E-09		2.1E-11
7440-41-7	Beryllium			1.2E-03	5.5E-08		1.6E-07		4.3E-08	1.2E-03	2.1E-07	1.2E-03	9.9E-08
106-99-0	Butadiene, 1,3-			2.8E-05	1.6E-08					2.8E-05	1.6E-08	2.8E-05	1.6E-08
7440-43-9	Cadmium			1.9E-03	7.0E-08		7.0E-07		1.3E-07	1.9E-03	7.7E-07	1.9E-03	2.0E-07
18540-29-9	Chromium (Hexavalent) (particulate)		1.4E-04	6.1E-04	7.3E-07					6.1E-04	7.3E-07	6.1E-04	7.3E-07
218-01-9	Chrysene (Benzo(a)phenanthrene)				1.4E-12		2.8E-10		4.4E-12		2.8E-10		5.8E-12
7440-50-8	Copper	1.1E-05											
53-70-3	Dibenz[a,h]anthracene				1.1E-10		4.2E-07		7.3E-11		4.2E-07		1.8E-10
100-41-4	Ethyl benzene	8.8E-09		3.4E-09						3.4E-09		3.4E-09	
50-00-0	Formaldehyde	2.0E-03		9.1E-04	3.5E-08					9.1E-04	3.5E-08	9.1E-04	3.5E-08
193-39-5	Indeno(1,2,3-cd)pyrene				1.2E-11		7.5E-07		4.5E-11		7.5E-07		5.7E-11
7439-92-1	Lead				1.4E-09		2.6E-09				4.0E-09		1.4E-09
7439-96-5	Manganese			1.4E-02						1.4E-02		1.4E-02	
7439-97-6	Mercury	6.5E-04	3.3E-04	1.6E-04		1.6E-04				3.2E-04		1.6E-04	
91-20-3	Naphthalene	9.5E-05		2.0E-05						2.0E-05		2.0E-05	
7440-02-0	Nickel	2.6E-04		7.6E-04	9.9E-09					7.6E-04	9.9E-09	7.6E-04	9.9E-09
10102-44-0	Nitrogen oxide (NO2)	5.4E-02											
130498-29-2	Polycyclic Aromatic Hydrocarbons (PAH)				1.9E-08		5.8E-06				5.8E-06		1.9E-08
00-01-7	Polycyclic Organic Matter (POM)				1.3E-07		3.8E-05				3.8E-05		1.3E-07
7784-49-2	Selenium			9.9E-06						9.9E-06		9.9E-06	
108-88-3	Toluene	4.0E-06		3.2E-06						3.2E-06		3.2E-06	
1330-20-7	Xylenes	2.2E-06		6.7E-06						6.7E-06		6.7E-06	
7440-66-6	Zinc												
00-03-3	Zinc Compounds												

Estimated Air Concentrations Used for the AERA

Facility Name: Faribault Energy Park
User Title: FEP Combined Cycle Calculations F

Air Concentrations in ug/m^3		Total - all stacks				
CAS # or MPCA #	Chemical Name	C (1-hr)	C (3-hr)	C (24-hr)	C (monthly)	C (annual)
SO2	SO2	3.5E+01	2.9E+01	8.1E+00	3.4E-01	1.6E-01
PM10	PM10	2.8E+02	2.4E+02	5.2E+01	1.3E+00	5.5E-01
PM2.5	PM2.5	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NOx	NOx	2.5E+01	2.0E+01	6.4E+00	1.0E+00	4.8E-01
CO	CO	3.4E+02	2.9E+02	6.3E+01	1.0E+00	4.5E-01
Pb	Pb	8.7E-03	7.3E-03	1.9E-03	2.6E-04	1.2E-04
7664-41-7	Ammonia	1.0E+01	8.9E+00	1.9E+00	1.0E-01	4.1E-02
7440-38-2	Arsenic	6.3E-03	5.3E-03	1.3E-03	1.6E-04	6.8E-05
56-55-3	Benz[a]anthracene	5.6E-06	4.1E-06	1.9E-06	4.4E-07	2.2E-07
71-43-2	Benzene	2.8E-02	2.4E-02	5.1E-03	5.1E-04	2.0E-04
207-08-9	Benzo(k)fluoranthene	2.0E-06	1.5E-06	7.0E-07	1.6E-07	7.8E-08
50-32-8	Benzo[a]pyrene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
205-99-2	Benzo[b]fluoranthene	2.0E-06	1.5E-06	7.0E-07	1.6E-07	7.8E-08
7440-41-7	Beryllium	7.3E-04	5.5E-04	2.3E-04	4.7E-05	2.3E-05
106-99-0	Butadiene, 1,3-	8.0E-03	6.9E-03	1.5E-03	1.4E-04	5.6E-05
7440-43-9	Cadmium	3.0E-03	2.5E-03	6.4E-04	8.7E-05	3.9E-05
18540-29-9	Chromium (Hexavalent) (particulate)	6.1E-03	5.1E-03	1.2E-03	1.4E-04	6.1E-05
218-01-9	Chrysene (Benzo(a)phenanthrene)	3.3E-06	2.4E-06	1.1E-06	2.5E-07	1.3E-07
7440-50-8	Copper	1.1E-03	8.4E-04	3.9E-04	8.9E-05	4.4E-05
53-70-3	Dibenz[a,h]anthracene	2.3E-06	1.7E-06	7.9E-07	1.8E-07	8.8E-08
100-41-4	Ethyl benzene	8.8E-05	6.4E-05	3.0E-05	6.8E-06	3.4E-06
50-00-0	Formaldehyde	1.9E-01	1.5E-01	4.1E-02	6.0E-03	2.7E-03
193-39-5	Indeno(1,2,3-cd)pyrene	2.9E-06	2.2E-06	1.0E-06	2.3E-07	1.1E-07
7439-92-1	Lead	8.7E-03	7.3E-03	1.9E-03	2.6E-04	1.2E-04
7439-96-5	Manganese	4.0E-01	3.4E-01	7.3E-02	7.0E-03	2.8E-03
7439-97-6	Mercury	1.2E-03	9.4E-04	3.1E-04	1.0E-04	4.8E-05
91-20-3	Naphthalene	1.9E-02	1.6E-02	3.7E-03	4.3E-04	1.8E-04
7440-02-0	Nickel	2.9E-03	2.4E-03	6.2E-04	8.5E-05	3.8E-05

Estimated Air Concentrations Used for the AERA

Facility Name: Faribault Energy Park
User Title: FEP Combined Cycle Calculations F

Air Concentrations in ug/m^3		Total - all stacks				
CAS # or MPCA #	Chemical Name	C (1-hr)	C (3-hr)	C (24-hr)	C (monthly)	C (annual)
10102-44-0	Nitrogen oxide (NO2)	2.5E+01	2.0E+01	6.4E+00	1.0E+00	4.8E-01
130498-29-2	Polycyclic Aromatic Hydrocarbons (PAH)	2.5E-03	2.1E-03	4.6E-04	4.4E-05	1.8E-05
00-01-7	Polycyclic Organic Matter (POM)	3.0E-03	2.2E-03	1.0E-03	2.3E-04	1.1E-04
7784-49-2	Selenium	1.5E-02	1.3E-02	3.3E-03	4.4E-04	2.0E-04
108-88-3	Toluene	1.5E-01	1.3E-01	2.8E-02	3.1E-03	1.3E-03
1330-20-7	Xylenes	9.5E-02	8.2E-02	1.7E-02	1.7E-03	6.7E-04
7440-66-6	Zinc	7.7E-04	5.6E-04	2.6E-04	5.9E-05	2.9E-05
00-03-3	Zinc Compounds	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Estimated Chemical Emission Rates Used for the AERA

Facility Name:	Faribault Energy Park
User Title:	FEP Combined Cycle Calculations Februar
Type of emissions (e.g., PTE/Future Actual)	PTE

CAS # or MPCA #	Chemical Name	HAP	VOC	Total Annual Emissions (tpy)	Stack(s)#1 Turbine		Stack(s)#2 Boiler		Summaries: SUM OF HAPS (TPY)	Summaries: SUM OF VOCS (TPY)	Summaries: Criteria Pollutant Sums
					Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)			
									13.886987	7.04175	
SO2	SO2	NO	NO	118.050000	92.4	115.5	2.05	2.55			118.05
PM10	PM10	NO	NO	839.149000	984.44	834.99	0.95	4.159			839.149
PM2.5	PM2.5	NO	NO								0
NOx	NOx	NO	NO	150.333000	51.85	140.25	2.3	10.083			150.333
CO	CO	NO	NO	429.502000	1191.48	423.2	1.44	6.302			429.502
Pb	Pb	NO	NO	0.111580	0.02521	0.11	0.00036	0.00158			0.11158
VOCs	VOCs	NO	NO	350.052000	1220.74	349.8	0.058	0.252		350.052	
Total HAPs	**Total HAPs**	NO	NO	13.884300	3.16	13.82	0.0147	0.0643	13.8843		
75-07-0	Acetaldehyde	YES	YES	0.195700	0.04467	0.1957	0	0	0.1957	0.1957	
107-02-8	Acrolein	YES	YES	0.061300	0.014	0.0613	0	0	0.0613	0.0613	
7664-41-7	Ammonia	NO	NO	92.000000	37.3	92	0	0			
7440-38-2	Arsenic	YES	NO	0.087500	0.01981	0.0868	0.00016	0.0007	0.0875		
56-55-3	Benz[a]anthracene	YES	NO	0.000005	0	0	0.00000118	0.00000517	5.17E-06		
71-43-2	Benzene	YES	YES	0.434270	0.09906	0.434	0.0000616	0.00027	0.43427	0.43427	
207-08-9	Benzo(k)fluoranthene	YES	NO	0.000002	0	0	0.000000426	0.00000187	1.87E-06		
50-32-8	Benzo[a]pyrene	YES	NO		0	0	0	0	0		
205-99-2	Benzo[b]fluoranthene	YES	NO	0.000002	0	0	0.000000426	0.00000187	1.87E-06		
7440-41-7	Beryllium	YES	NO	0.002975	0.00056	0.00245	0.00012	0.000525	0.002975		
106-99-0	Butadiene, 1,3-	YES	YES	0.126000	0.02882	0.126	0	0	0.126	0.126	
7440-43-9	Cadmium	YES	NO	0.038425	0.00864	0.0379	0.00012	0.000525	0.038425		
18540-29-9	Chromium (Hexavalent) (particulate)	YES	NO	0.087325	0.01981	0.0868	0.00012	0.000525	0.087325		
218-01-9	Chrysene (Benzo(a)phenanthrene)	YES	NO	0.000003	0	0	0.000000685	0.000003	0.000003		
7440-50-8	Copper	NO	NO	0.001050	0	0	0.00024	0.00105			
53-70-3	Dibenz[a,h]anthracene	YES	YES	0.000002	0	0	0.000000481	0.00000211	2.11E-06	2.11E-06	
100-41-4	Ethyl benzene	YES	YES	0.000080	0	0	0.0000183	0.0000802	0.0000802	0.0000802	
50-00-0	Formaldehyde	YES	YES	2.251600	0.50428	2.21	0.0095	0.0416	2.2516	2.2516	
193-39-5	Indeno(1,2,3-cd)pyrene	YES	YES	0.000003	0	0	0.000000616	0.0000027	0.0000027	0.0000027	

Estimated Chemical Emission Rates Used for the AERA

Facility Name: Faribault Energy Park
User Title: FEP Combined Cycle Calculations Februar
Type of emissions (e.g., PTE/Future Actual) PTE

CAS # or MFCA #	Chemical Name	HAP	VOC	Total Annual Emissions (tpy)	Stack(s) 1 Turbine		Stack(s) 2 Boiler		Summaries		
					Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	SUM OF HAPS (TPY)	SUM OF VOCS (TPY)	Criteria Pollutant Sums
									13.88698	7.04175	
7439-92-1	Lead	YES	NO	0.111580	0.02521	0.11	0.00036	0.00158	0.11158		
7439-96-5	Manganese	YES	NO	6.231050	1.423	6.23	0.00024	0.00105	6.23105		
7439-97-6	Mercury	YES	NO	0.010515	0.00216	0.009465	0.00012	0.00105	0.010515		
91-20-3	Naphthalene	YES	YES	0.277420	0.06304	0.276	0.000325	0.00142	0.27742	0.27742	
7440-02-0	Nickel	YES	NO	0.036825	0.00828	0.0363	0.00012	0.000525	0.036825		
10102-44-0	Nitrogen oxide (NO2)-input NOx emissions with criteria pollutants	NO	NO	150.333000	34.65	151.25	2.3	10.083			
130498-29-2	Polycyclic Aromatic Hydrocarbons (PAH)	YES	NO	0.039400	0.009	0.0394	0	0	0.0394		
00-01-7	Polycyclic Organic Matter (POM)	YES	YES	0.002720	0	0	0.00062	0.00272	0.00272	0.00272	
7784-49-2	Selenium,	YES	NO	0.199630	0.04503	0.197	0.0006	0.00263	0.19963		
108-88-3	Toluene	YES	YES	2.193420	0.49899	2.1856	0.00178	0.00782	2.19342	2.19342	
1330-20-7	Xylenes	YES	YES	1.499235	0.34227	1.4991	0.00003	0.000135	1.499235	1.499235	
7440-66-6	Zinc	NO	NO	0.000701			0.00016	0.000701			
00-03-3	Zinc Compounds	NO	NO								

Air Dispersion Factors for Estimated Air Concentrations for the AERA

Facility Name:	Faribault Energy Park
User Title:	FEP Combined Cycle Calculations February 2004 Ver:
Type of emissions	PTE

Batch Process (Or other)	Stack(s)#1	Stack(s)#2
1-hr dispersion value from batch process or other air dispersion modeling	2.205	37.98
3-hr dispersion value from batch process or other air dispersion modeling	1.893	27.84
8-hr dispersion value from batch process or other air dispersion modeling	0.9916	20.11
24-hr dispersion value from batch process or other air dispersion modeling	0.4041	13.03
Monthly dispersion value from batch process or other air dispersion modeling	0.03877	2.946
Annual dispersion value from batch process or other air dispersion modeling	0.01547	1.454

Facility Name:	Faribault Energy Park
User Title:	FEP Combined Cycle Calculations February 2004 Version

Chemicals Potentially Emitted, but Emission Rates were Unavailable

No emissions rates for:	1,4-dichlorobenzene
	Carbon tetrachloride
	Tetrachloroethylene
	Chlorobenzene
	Chloroform
	Vinylidene chloride
	Vinyl chloride
	Ethylene dichloride
	Methylene chloride

These chemicals plus those for which emission estimates were available are the Chemicals of Potential Interest (COPI)

Inhalation Health Benchmarks Used to Estimate Risks for the AERA

						Acute					Annual Cancer Assessment						Annual Chronic Noncancer Assessment						Subchronic Noncancer Assessment					
Surrogate?	Group	CAS # or MPCA#	Chemical Name	HAP?	VOC?	Tox Value Source	Acute Air Conc (ug/m3)	Toxic Endpoint	Notes	Surrogate CAS	Surrogate Name	Tox Value Source	Unit Risk (ug/m3)-1	10-5 Cancer-based Air Conc (ug/m3)	Notes	Surrogate CAS	Surrogate Name	Tox Value Source	Reference Conc (ug/m3)	Toxic Endpoint	Notes	Surrogate CAS	Surrogate Name	Tox Value Source	Reference Conc (ug/m3)	Toxic Endpoint	Notes	Surrogate CAS	Surrogate Name
		7664-41-7	Ammonia	NO	NO	HRV	3200	irritant - eye and respiratory system										HRV	80	upper and lower respiratory system				HEAST	100	nasal cavity, lungs			
SUR	As	7440-38-2	Arsenic	YES	NO	CAL EPA	0.19	reproductive/developmental				HRV	4.3E-03	2.3E-03				CAL EPA	0.03	Development; cardiovascular system; nervous system		7440-38-2	Arsenic and compounds						
	PAH	56-55-3	Benz[a]anthracene	YES	NO							CAL EPA	1.1E-04	9.1E-02															
		71-43-2	Benzene	YES	YES	HRV	1000	developmental				HRV	7.8E-06	1.3E+00				IRIS	30	decreased lymphocyte count									
	PAH	207-08-9	Benzo(k)fluoranthene	YES	NO							CAL EPA	1.1E-04	9.1E-02															
	PAH	50-32-8	Benzo[a]pyrene	YES	NO							CAL EPA	1.1E-03	9.1E-03															
	PAH	205-99-2	Benzo[b]fluoranthene	YES	NO							CAL EPA	1.1E-04	9.1E-02															
SUR	Be	7440-41-7	Beryllium	YES	NO							HRV	2.4E-03	4.2E-03				IRIS	0.02	beryllium sensitization and progression to CBD		7440-41-7	Beryllium & compounds						
		106-99-0	Butadiene, 1,3-	YES	YES							HRV	2.8E-04	3.6E-02				IRIS	2	Reproductive system									
SUR	Cd	7440-43-9	Cadmium	YES	NO							HRV	1.8E-03	5.6E-03				CAL EPA	0.02	Kidney; respiratory system		7440-43-9	Cadmium & compounds						
	Cr	18540-29-9	Chromium (Hexavalent) (particulate)	YES	NO							HRV	1.2E-02	8.3E-04				IRIS	0.1	lower respiratory system				HRV	1	Lower respiratory			
	PAH	218-01-9	Chrysene (Benzo(a)phenanthrene)	YES	NO							CAL EPA	1.1E-05	9.1E-01															
SUR	Cu	7440-50-8	Copper	NO	NO	CAL EPA	100	respiratory system			Copper and compounds																		
	PAH	53-70-3	Dibenz[a,h]anthracene	YES	YES							CAL EPA	1.2E-03	8.3E-03															
		100-41-4	Ethyl benzene	YES	YES	HRV	10000	developmental										IRIS	1000	developmental toxicity									
	ALD	50-00-0	Formaldehyde	YES	YES	HRV	94	irritant - eye and respiratory system	4			HRV	1.3E-05	7.7E-01				CAL EPA	3	Resplratory system; eyes	4								
	PAH	193-39-5	Indeno(1,2,3-cd)pyrene	YES	YES							CAL EPA	1.1E-04	9.1E-02															
SUR	Pb	7439-92-1	Lead	YES	NO							CAL EPA	1.2E-05	8.3E-01		7439-92-1	Lead & compounds												
	Mn	7439-96-5	Manganese	YES	NO													HRV	0.2	nervous system									
	Hg	7439-97-6	Mercury	YES	NO	CAL EPA	1.8	reproductive/developmental										IRIS	0.3	neurotoxicity				HEAST	0.3	nervous system			
	PAH	91-20-3	Naphthalene	YES	YES	hbv	200	respiratory										hbv	9	Nasal Effects, respiratory impacts									
SUR	Ni	7440-02-0	Nickel	YES	NO	HRV	11	irritant - respiratory system			Nickel and nickel compounds	CAL EPA	2.6E-04	3.8E-02		12035-72-2	Nickel subsulfide	CAL EPA	0.05	Respiratory system; hematopoietic system			Nickel & compounds (not nickel oxide)						
		10102-44-0	Nitrogen oxide (NO2)	NO	NO	CAL EPA	470	respiratory system																					
SUR	PAH	130498-29-2	Polycyclic Aromatic Hydrocarbons (PAH)	YES	NO							CAL EPA	1.1E-03	9.1E-03		50-32-8	Benzo[a]pyrene												
SUR	PAH	00-01-7	Polycyclic Organic Matter (POM)	YES	YES							CAL EPA	1.1E-03	9.1E-03		50-32-8	Benzo[a]pyrene												
SUR	Se	7784-49-2	Selenium	YES	NO													CAL EPA	20	Alimentary system; cardiovascular system; nervous			Selenium and compounds other than hydrogen selenide						
		108-88-3	Toluene	YES	YES	HRV	37000	irritant- eye and respiratory system; CNS										HRV	400	nervous/upper resplratory sys.									
	Xylenes	1330-20-7	Xylenes	YES	YES	HRV	43000	irritant - eye and respiratory system; CNS										IRIS	100	Nervous system; respiratory system									
	Zn	7440-66-6	Zinc	NO	NO																								
	Zn	00-03-3	Zinc Compounds	NO	NO																								

1. An inhalation unit risk of 260 (ug/m3)-1 was calculated using the MDH and USEPA-recommended oral slope factor of 1.4E+06 (mg TCDD TEQ/kg/d)$^{-1}$ assuming an inhalation rate of 13.0 m3/day by a 70 kg adult and assuming 100% absorption.
2. Dioxin and furan congener concentrations were calculated using the World Health Organization's 1998 Toxic Eqivalency Factor (TEF) scheme to weight each compound according to its toxicity relative to 2,3,7,8-TCDD.
3. 'Petroleum Hydrocarbon, Aliphatic' value was derived based on Inhalation Studies on Dearomatized Petroleum Streams in: Development of Fraction Specific Reference Doses and Reference Concentrations from Total Petroleum Hydrocarbons, Volume 4, Total Petroleum Hydrocarbon Working Group Series. The value can be applied to aliphatic petroleum mixtures containing primarily C9 - C16 and minimal aromatics.
4. This chronic value may not provide protection for previously-sensitized individuals
5. Acute MDH HRV is for irritancy, but there is little difference between the level where mild irritancy occurs and levels where more severe adverse health effects occur
6. The chronic HRV for diesel particulates was not developed as protective for potential cancer effects

MPCA # - An identification number, smaller than 50-00-0, assigned by MPCA
HRV - Minnesota Department of Health Health Risk Value
hbv - Health Based Value
IRIS - EPA Integrated Risk Information System
CAL EPA - California Office of Environmetal Health Hazard Assessment
HEAST - EPA Health Effects Assessment Summary Tables
MPCA - Minnesota Pollution Control Agency value

Faribault Energy Park
Estimated Mercury Emissions

Summary of Information Requested in "Assessing the Impacts of Mercury Releases to Ambient Air" (Mercury Guidance)

Prepared by Ned Brooks 3/31/04

1. Emissions estimates. (Based on estimates prepared by Marshall Cole 3/29/04, see attached)

Estimated Emissions, lbs/yr

Scenario	Fuel	Emissions factor source	Lbs hg/yr
Simple Cycle Min	No. 2 distillate /Natural Gas		0.78
Combined Cycle	Natural Gas	AP-42 (boilers)	4.19
Combined Cycle	No. 2 Distillate	AP-42 *	18.94*
Combined Cycle	No. 2 Distillate	CATEF	0.31
Combined Cycle	No. 2 Distillate	MPCA sampling of Mn No. 2 distillate	0.57

* This is based on EPA's AP-42 emission factor for No. 2 distillate, which has an EPA rating of 'D' (tests were based on a generally unacceptable method but may provide an order of magnitude value for the source).

Using what the MPCA believes to be more reliable emissions factors (California Toxic Emissions Factors database and actual mercury concentration in fuel oil in Minnesota refineries sampled by the MPCA) the MPCA estimates emissions of less than 1 pound per year.

2. Current mercury reduction measures. Not required.

3. Mercury Flow diagram. (attached)

4. Evaluation of Alternatives. Submitted as part of Certificate of Need

Marshall Cole March 29, 2004

Mercury Emission Factors and Emissions
for
Natural Gas and No. 2 Distillate Fuel Oil-fired CombustionTurbines

SUMMARY

Fuel	Mercury Emission Factor Source	lb/hr	lb/yr
Natural Gas	AP-42 (boilers; no data for gas turbines)	4.78 E-04	4.19
No. 2 distillate	AP-42	2.16 E-03	18.94
No. 2 distillate	CATEF	3.51 E-05	0.31
No. 2 distillate	Ed Swain data	6.35 E-05	0.56
No. 2 distillate	EPA Locating and Estimating Documents	not calculated - see discussion below	

Natural Gas

Factor Source: AP-42 ch. 1-4 natural gas combustion in external combustion units/boilers

Factor: 2.6 E-04 lb/10^6 scf of natural gas; EPA factor rating of 'D' which is defined as "Tests that were based on a generally unacceptable method but may provide an order of magnitude value for the source."
Factor is based on tests on 2 boilers with results of 1.76 E-04 lb/mmscf (utility boiler EPRI site 120, April 4, 1993) and 3.34 E-04lb/mmscf (Gibson Oil Refinery industrial boiler, Bakersfield CA May 17, 1990)

To convert to lb/mmBtu,

2.6 E-04 lb/10^6 scf * scf/1020 Btu = 2.549 E-07 lb/mmBtu

For FEP combined cycle operation, 100% load on natural gas is 1876 mmBtu/hr

1876 mmBtu/hr * 2.549 E-07 lb/mmBtu = 4.78 E-04 lb/hr * 8760 hr/yr
= 4.19 lb/yr for NG

NOTE: This is the only source I was able to locate for any natural gas Hg emission factor

No. 2 Distillate Fuel Oil (DFO)

1DFO. Factor source: *CATEF*

1 source tested (industrial cogeneration turbine; date unknown) EPA Factor Rating: E

	lbs/Mgal	lb/mmBtu
Mean:	2.71E-06	1.95 E-08
Median:	1.64E-06	1.18 E-08
Maximum:	5.14E-06	3.70 E-08
Minimum:	1.34E-06	9.64 E-09

For FEP combined cycle operation, use the mean factor value with 100% load on oil at 1801.4 mmBtu/hr

1801.4 mmBtu/hr * 1.95 E-08 lb/mmBtu = 3.51 E-05 lb/hr * 8760 hr/yr
= 0.3077 lb/yr for No. 2 distillate oil

2DFO. Factor Source: *AP-42* chapter 3.1, Table 3.1-5

1.2 E-06 lb/mmBtu EPA factor rating 'D'

1801.4 mmBtu/hr * 1.2 E-06 lb/mmBtu = 2.16 E-03 lb/hr * 8760 hr/yr
= 18.94 lb/yr for No. 2 distillate oil

Factor background data from AP-42 Section 3.1 - Stationary Gas Turbines for Electricity Generation

Facility: Imperial Irrigation, Imperial CA
Date: January 1991
Turbine data: General Electric model NS5000P 46.3 MW power generation, 100% load, no emission controls; 3 test runs, 2 of which were non-detect

3DFO. Factor Source: *Locating and Estimating documents* in EPA CHIEF website, for mercury at this link http://www.epa.gov/ttn/chief/le/mercury2.pdf second paragraph page 6-17.

Because only a single mean value was found in the literature for mercury concentration in distillate oil, no conclusions can be drawn about the range of mercury in distillate oil. Table 6-11 lists typical values for mercury in oils, which were obtained by taking the average of the mean values found in the literature. The value for distillate oil is the single data point found in the literature and may not be as representative as the values for residual and crude oils *(<0.12 ppmwt).*

No emissions data will be calculated using this value.

4DFO. Emission based on actual mercury in distillate fuel oil data provided by Ed Swain

Flint Hills and Ashland refineries in Minnesota - samples contain a maximum content of 0.6 ng/milliliter with an average density of 0.87 g/ml (specific gravity of 0.87) which equals a density of 7.25 lb/gal

0.6ng/ml * ml/0.87g = 6.0 E-10 g/8.7 E-01 g = 0.69 ppb by wt (6.9 E-10)

6.9 E-10 * 7.1 lb/gal * 12,960 gal/hr = 6.35 E-05 lb/hr * 8760 hr/yr = 0.56 lb/yr

Note: 12,960 gal/hr is fuel oil consumption rate at maximum heat input of 1801.4 mmBtu/hr and 7.1 lb/gal is assumed density of No. 2 distillate fuel oil